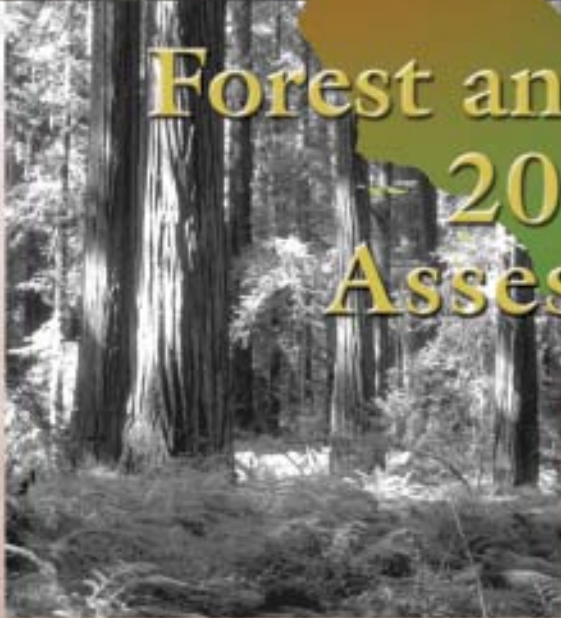


An aerial photograph of a California landscape, showing a mix of forested hills, agricultural fields, and some residential areas. A semi-transparent map of California is overlaid on the image, with the text 'The Changing California' in a gold, serif font.

# *The Changing California*

A black and white photograph of a forest with tall, straight trees, likely redwoods or sequoias. The text 'Forest and Range Assessment 2003' is overlaid in a gold, serif font.

## Forest and Range 2003 Assessment

A black and white photograph of a large, spreading oak tree in a field. Two cows are visible in the background.

Assessment Summary

October 2003

**On-line 2003 Assessment**  
<http://www.frap.cdf.ca.gov/assessment2003>

The California Department of Forestry and Fire Protection's (CDF) Fire and Resource Assessment Program (FRAP) was established under the Forest and Rangeland Resources Assessment and Policy Act of 1977. FRAP provides forest and range resource assessment, fire protection planning and analysis, and support for CDF's strategic decision making.



1920 20th Street  
Sacramento, California 95814  
(916) 227-2651  
Fax (916) 227-2672

For additional Forest and Range 2003 Assessment information, visit the FRAP web site at <http://www.frap.cdf.ca.gov/assessment2003>

#### PRODUCED BY:

CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION  
FIRE AND RESOURCE ASSESSMENT PROGRAM (FRAP)

William Stewart, Unit Chief  
Dean Cromwell, Research Manager  
Christopher Zimny, Assessment Project Leader  
Robin Marose, Chief Technology Officer  
Russ Henly, Watershed Chief

#### Professional Staff

Chris Fischer, Watershed Forester  
Elsa Hucks, GIS Analyst  
Chris Keithley, Watershed GIS Specialist  
Paul Knott, GIS Analyst  
Jeremy Lockwood, Web Developer  
Robert Motroni, Senior Wildlife Biologist  
Mark Rosenberg, Research Program Specialist  
David Sapsis, Fire Scientist  
Shawn Saving, Assessment GIS Leader  
James Spero, Research Program Specialist  
Eric Spry, Information Systems Administrator  
Tian Ting-Shih, Forest Economist

#### Publications Staff

Joanne Cemo, Publications Leader  
Erin Klaesius, Research Assistant/Graphic Designer  
Lisa Hartman, Copy Editor  
Patti Cox, Publications Support

#### Research Assistants

Lian Duan, GIS Energy Analyst  
Bill Frerichs, Database Analyst  
Lori Gustafson, GIS Graphics  
Lianne Mahon, GIS Change Detection  
Katie Trapp, GIS Fire Analyst  
Eric Wheeler, Publications Assistant

*The Changing California:*  
Forest and Range 2003 Assessment

**Assessment Summary**

**October 2003**

**State of California**  
**The Resources Agency**  
**Department of Forestry and Fire Protection**  
**Fire and Resource Assessment Program**

## Messages



### **Governor Gray Davis**

California's environment is precious to us all. My administration has worked hard to craft an environmental policy built upon California's long-standing respect for our natural resources. The protection of our state's forests and rangelands is a top priority as we seek to improve our economic and social well being. The information provided by the Forest and Range 2003 Assessment will help promote the responsible management and preservation of our state's valuable forests and rangelands. Through such efforts, we will leave a priceless legacy for future generations.



### **Secretary for Resources Mary D. Nichols**

The Davis administration has worked hard to improve and develop stewardship programs for California's working landscapes. This involves a variety of approaches including improved communication with landowners. It also requires up-to-date and comprehensive information about the current conditions, trends, and future risks to our forests and rangelands. The Forest and Rangeland 2003 Assessment provides this information, and is an important tool for state agencies to continue their efforts to develop stewardship programs for private landowners, along with the administration's many other programs and projects to protect and preserve our natural legacy.



### **Department of Forestry and Fire Protection Director Andrea E. Tuttle**

The resource demands, ecological pressures, and social debates about California's forests and rangelands grow in proportion to our population and the complexity of our lives. This assessment offers a rich portrait of California's natural, economic, and social environment and presents a new, high level of data needed to better inform our decisions. This volume rests on a deep underpinning of primary data, maps, tables, and reports which are contained in the FRAP web pages. The California Department of Forestry and Fire Protection and our FRAP unit are proud to offer this comprehensive report to all of California's private and public stakeholders who participate in the decision making process and care deeply about our resources, social well being, and natural heritage.



### **Chairman of the California State Board of Forestry and Fire Protection Stan L. Dixon**

By law, the California State Board of Forestry and Fire Protection has the responsibility to provide leadership in developing policies for California's forests and rangelands in partnership with other agencies, landowners, and the public. A primary goal of the Board is to articulate a path that can provide direction, resolve conflict, forge stronger working relationships, and attract the means necessary to ensure sustainability of forest and range resources. The Board's key research and analysis branch, the CDF Fire and Resource Assessment Program, is instrumental in providing the information for attainment of the Board's goals via "The Changing California: Forest and Range 2003 Assessment."

# *Table of Contents*

<b>Programs and Selected Reports with Emphasis on Natural Resource Conservation</b>	vi
<b>Director's Foreword</b>	viii
<b>Executive Summary</b>	1
Assessment Content	2
Assessment Framework	2
California's Forests and Rangelands—A World of Change	3
Two Decades of Change on California's Forests	5
Two Decades of Change on California's Rangelands	12
Highlighted Themes	18
Policy Challenges and Options	20
<b>Introduction</b>	21
Geographic Scope	22
Regional and County Perspectives	24
Integrating Spatial Information at Local Levels	26
Ownership	28
Management Landscape	30
Gateway to Assessment Products	32
On-line Technical Reports	33
The 2003 Assessment and the Montréal Process	34
<b>Status and Trends of Forest and Rangeland Resources</b>	39
1. Biological Diversity	40
Historical Loss of Forests and Rangelands	42
Parcelization of Forests and Rangelands	42
Area and Distribution of Habitat Types	46
Conifer Forest Structural Characteristics—Size and Density	48
Old Growth Forests	49
Area and Distribution of Hardwoods	50
Management Classification and Distribution of Habitats	50
Population Status of Native Species	52
Status of Endangered, Threatened, and Sensitive Flora and Fauna	53
2. Productive Capacity	54
Actual and Potential Growth of Trees on Timberland	56
Forest Land Available for Timber Production	58
Characteristics of Timberland Growing Stock	61
Timber Harvest Versus Growth Between 1984 and 1994	65
Rangeland Available for Grazing	67
Rangeland Grazing Capacity Compared to Use	69

# *Table of Contents*

3. Forest Health	70
Land Management Activities	70
Land Management and Resource Outputs	72
Metropolitan Forests and Rangelands	76
Locations of Range Livestock Management Activities	78
Impacts from Timber Production	81
Lands in Reserve Status	84
Development	87
Projected Loss and Alteration of Land Cover due to Housing Development	88
Projected Loss and Alteration of Hardwood Land Cover due to Development	92
Wildfire	94
Wildland Fire Threat	97
Proportion of Forests and Rangelands Susceptible to Ecosystem Health Risks from Wildfire	98
Proportion of Housing Units in the Wildland Urban Interface at Significant Risk from Fire	100
Pests and Disease	104
Proportion of Conifer Forest Areas at High Risk to Pest Damage through 2015	106
Identification of Emerging Pests and Diseases	108
Presence or Absence of Range Livestock Diseases	109
Exotic and Invasive Species	110
Presence of High Impact Non-native Invasive Plants	112
Proportion of Non-native Animal Species Relative to Total Species	114
Presence of Weed Control Programs	115
Air Pollution	116
Trends of Air Pollution Levels Expressed in Non-attainment Days	118
4. Soil Conservation and Water Quality	122
Land Use in Watersheds	124
Regulatory Status of Water Quality Impairments	126
Trends in Salmon Populations	128
Monitoring Results of Private Timber Management Practices	129
Monitoring Watershed Assessment, and Cumulative Watershed Effects	130
5. Forests and Climate Change	132
Impacts of Climate Change on Forest and Rangeland Resources	134
Effects of Forests on Carbon Levels	135
Trends in Greenhouse Gas Emission Reduction	135
Programs to Reduce Emissions of Greenhouse Gases	136

6. Socio-Economic Well Being	138
Income and Well Being Index	140
Regional Job and Wage Trends	143
Commodity and Non-Commodity Production and Use Trends	144
Water Quantity and Use	146
Status of Forest Products Industry	148
Status of Range Livestock Industry	151
Status of Forest and Range Energy-Related Industry	155
Status of Recreation Industries	156
Timber and Rangeland Contributions to Funding Rural Infrastructure Needs	160
7. Governance	162
Regulatory Jurisdictions over Management Activities	164
Level of Conflict	167
Level of Cooperation, Information Sharing, and Education	169
Governance Resource Investments	171
<b>Policy Challenges and Options</b>	173
Policy Challenges and Options for California's Landscapes	174
Detailed Policy Goals and Benchmarks, Challenges, and Options	179
Biological Diversity	181
Productive Capacity	183
Forest Health	184
Soil Conservation and Water Quality	190
Forests and Climate	192
Socio-Economic Well Being	193
Governance	197
<b>Appendix</b>	
List of Figures	A-2
List of Tables	A-4
Data Quality Index	A-6
Montréal Process Indicators	A-8
Glossary	A-10
Index	A-18
Bibliography	A-21
County Land Cover Area	A-26
Statewide Habitat Area	A-27
Other Participants	A-28
Maps	A-30

# ***Programs and Selected Reports from State Agencies and Office of the Governor with Emphasis on Natural Resource Conservation***

The Forest and Range Assessment of 2003 is one of a series of programs and reports that bring a sophisticated perspective to the management of California's natural resources. These efforts of the Davis administration paint the portrait of California's current resource conditions and promote a vision of how this priceless legacy may be conserved and managed for the future.

## **California Department of Conservation**

Division of Land Resource Protection, ***Farmland Monitoring and Mapping Program***

[http://www.consrv.ca.gov/DLRP/fmmp/pubs/1998\\_2000/FMMP\\_1998-00\\_FCR.htm](http://www.consrv.ca.gov/DLRP/fmmp/pubs/1998_2000/FMMP_1998-00_FCR.htm)

The Farmland Mapping and Monitoring Program (FMMP) produces maps and statistical data used for analyzing impacts on California's agricultural resources.

## **California Department of Fish and Game**

Habitat Conservation Planning Branch

<http://www.dfg.ca.gov/hcpb>

This group includes the Conservation Planning Program (including Natural Community Conservation Planning), CESA/CEQA Permitting Program, and the Species Conservation and Recovery Program.

Wildlife and Habitat Data Analysis Branch

<http://www.dfg.ca.gov/whdab>

This arm of DFG includes among other things the California Natural Diversity Database, California Wildlife Habitat Relationships information system, and the Vegetation Classification and Mapping Program.

Wildlife and Inland Fisheries Division

This division includes the Enforcement Branch, Fisheries Program Branch, and the Wildlife Programs Branch with programs focusing on Fish and Game regulations, management of the state's lands and facilities, as well as large mammal management programs.

## **California Department of Parks and Recreation**

Planning Division, ***The State Park System Plan 2002; Part I: A System for the Future and Part II: Initiatives for Action***

[http://www.parks.ca.gov/default.asp?page\\_id=797](http://www.parks.ca.gov/default.asp?page_id=797)

This fundamental document contains goals, policies, objectives, and proposals for new programs and initiatives needed for the guidance of the State Park System over the course of the next decade.



### **California Department of Water Resources**

Water Use and Planning, **California Water Plan Update**

<http://www.waterplan.water.ca.gov/b160/indexb160.html>

The Department of Water Resources' California Water Plan Update 2003 (Bulletin 160-03) supports California's plan and strategy to meet the State's future water needs.

### **California Environmental Protection Agency**

Office of Environmental Health Hazard Assessment, **Environmental Protection Indicators for California**  
<http://www.oehha.ca.gov/multimedia/epic/index.html>

The Environmental Protection Indicators for California (EPIC) Project was created to support a commitment to use measurable results in judging the effectiveness of the State's efforts directed at environmental protection.

State Water Resources Control Board, **Total Maximum Daily Loads**

<http://www.swrcb.ca.gov/tmdl/tmdl.html>

The State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards have ongoing efforts to monitor and assess water quality and identify waters that do not meet water quality standards and prioritize waters/watersheds for total maximum daily loads (TMDL) development.

### **California Resources Agency**

**The California Legacy Project: a Resource Conservation Strategy**

<http://legacy.ca.gov>

The California Legacy Project is a new initiative that involves a broad range of government agencies and citizen organizations working together to help make the important decisions about conserving and protecting California's many landscapes.

### **The California Environmental Resources Evaluation System (CERES)**

<http://ceres.ca.gov/index.html>

CERES is an information system developed by the California Resources Agency to facilitate access to a variety of electronic data describing California's rich and diverse environments.

### **California Biodiversity Council**

<http://ceres.ca.gov/biodiv>

The California Biodiversity Council (CBC) was formed in 1991 to improve coordination and cooperation between the various resource management and environmental protection organizations at federal, state, and local levels.

Joint Task Force on California Watershed Management, **Addressing the Need to Protect California's Watersheds: Working with Local Partnerships**

<http://resources.ca.gov/watershedtaskforce>

The purpose of this report is to evaluate how effective voluntary, community-based, collaborative watershed efforts or partnerships are in contributing to the protection and enhancement of California's natural resources, and what the State can do to assist them.

### **Governor's Office of Planning and Research Environmental Goals and Policy Report**

<http://www.opr.ca.gov/EnvGoals/EnvGoals.shtml>

The Office of Planning and Research is in the process of developing a new state Environmental Goals and Policy Report containing a long-range overview of state growth and state environmental goals, including those directed to land use, population growth, and conservation of natural resources.

### **Wildlife Conservation Board**

<http://www.dfg.ca.gov/wcb>

The Board administers land acquisition, public access, riparian, wetland, and oak woodland conservation and restoration programs.

## Director's Foreword

Ask most Californians about our forests, and powerful images come to mind—redwood giants towering in the mist, sweet smelling pines in the afternoon sun. Forests mean more to us than trees—they also symbolize our need for wild places, for places where nature follows its own dynamics, for expanses where humans do not dominate. Even if we cannot visit wild areas ourselves, we want our forests to be there.

Our forests and rangelands also shape our image of rural California. They form the working landscapes that evoke simpler times of the past. Rangelands and forests have supported generations of Californians raising products from the land—cattle for market, wood that is renewable. On smaller ownerships, timber is a supplement to family income. On larger ownerships, commercial forests sustain whole economies of mill workers, foresters, tree planters, logging contractors, biologists, and a local tax base. When the mill closes and the land is sold, we lose not just the wood products it produces, but also a piece of our heritage.

Ask most Californians who owns the forests and you will find little clarity. National parks are confused with national forests, state parks are blurred with state forests, commercial and non-industrial timberlands are jumbled together, and the management goals of each are unclear. Ecological processes are often misunderstood as well. Tall forests cut and re-grown two or three times since the 1800s may now look untouched. Overstocked stands caused by decades of fire suppression are often perceived as natural. Fears that all old-growth is gone forget the millions of acres protected in parks and wilderness. Few realize that most water from our taps is connected to runoff from distant forests. Simplistic images of timber barons versus treesitters, and clearcuts versus watersheds may make catchy headlines, but Californians deserve more depth to the story.

California is blessed with some of the best soils and climate for growing trees in the world. Compared to the boreal forests of the north, our conifers grow fast and reproduce well. Unlike non-native monoculture plantations on other continents, California grows mixed stands of native species, even on our most intensely managed



*Giant Sequoias on Case Mountain, Tulare County. Photo courtesy of Bureau of Land Management.*

lands. Our forest species—the pines, the firs, the redwoods, and the hardwoods—can be sustained into the future if we respect their need for sunlight and space.

But the fate of our forestlands is at a crossroads. The threats of the past are not the same as today. In spite of debates that surround particular harvest plans, the harvest practices of today meet strong environmental standards. Managed forests throughout the state have started on a path of recovery—old roads are being relocated away from streams, culverts and crossings repaired, more trees grown than cut, snags and structure

left for wildlife, and large wood is being left in streams to create pools for salmon. With time, sediment from past abuses is clearing out of streams and conditions are improving. Guided by better scientific understanding of watershed dynamics, land managers are already planning at large watershed scales and improving conditions on the ground.

Our focus on watersheds is important, but the conversation urgently needs to expand. While we debate particular management issues, the forest land base is slipping away. California currently grows by half a million new residents each year, who demand more water, recreation, wood products, jobs, open space, and places to live. The combined effects of international markets, increasing land prices, escalating regulatory costs and punitive rather than cooperative attitudes towards timber management are forcing landowners to re-examine their choices. From Santa Cruz to Mendocino, from Shasta to Mariposa, we see fragmentation of parcels and conversion of forest and rangelands to other uses. This wave of development ripples even into Siskiyou and Humboldt. We need to raise our sights to the broader issue of sustaining the very land base we care about.

### **Starting the Conversation**

This Forest and Range Assessment of 2003 presents an overview of the status and trends in our forests and rangelands to provide a broad factual basis for this discussion. We examine sustainability through the lenses of environmental, economic, and social conditions, with the belief that all can be improved without loss in another. By clarifying the challenges and opportunities, we can select the appropriate tools to move us forward. We use the

language of the international Montréal Protocol to frame the analysis in a manner that ensures consistent national and international monitoring. We bring new attention to the issue of global climate change and its enormous implications for forest growth, carbon sequestration, and the distribution of forest ecosystems everywhere.

California has always taken pride in its uniqueness, but we also recognize our place in the larger global context. The decisions we make about sustainability here affect the rest of the globe, not just ourselves. If we choose to manage only for untouched forests, we risk exporting our demand for wood products to other regions with lower environmental standards, and weaken our own rural economies here. Our combination of federal, state and private land ownerships gives us many options for providing a vibrant range of values, services and products. With our strong environmental ethic and sense of obligation to our global responsibilities, Californians can set an example in finding the right mix of wise management and protection.



*Blue oak woodland , Sierra foothills, Butte County. Jeff Gnass, photographer.*

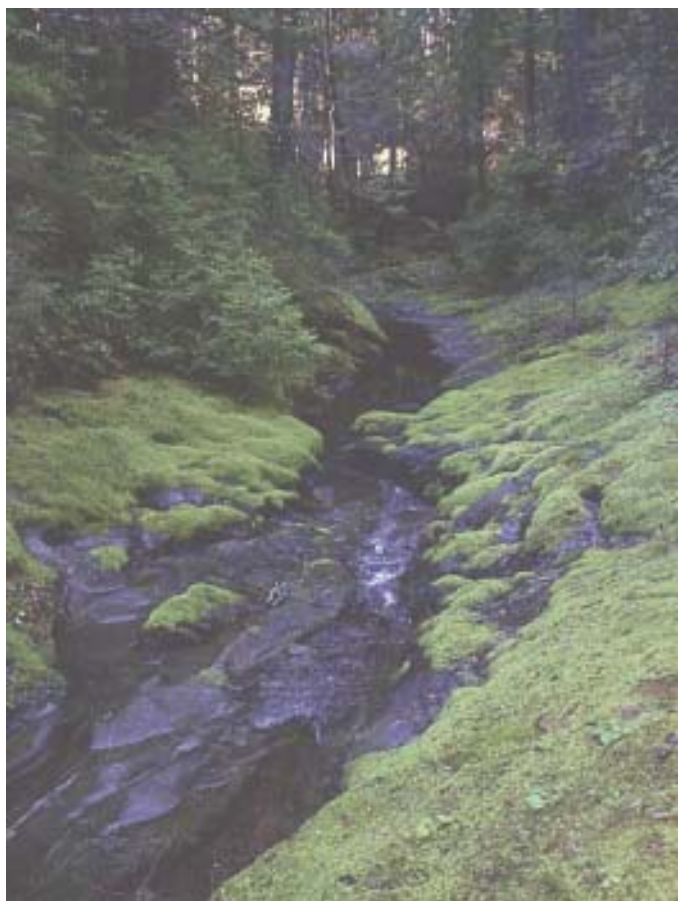
This overview of California's forests and rangelands provides a positive status report and lays out our challenges. We have the critical elements for problem solving already in place—a strong environmental ethic, well-developed economic and regulatory institutions, and respect for law. These advantages help us envision a landscape where we respect diverse ownerships and goals, and strive for cooperative solutions.

Between the covers of this volume you will find some of the most current information available on California's forests and rangelands. It is supported by a wealth of additional data on in-depth web pages. We hope this will provide a factual basis for the critical discussions we need.

California is blessed with a variety of forests, wildlife species, streams, open spaces, wood products and rural communities. We have landowners who want to manage their lands well. We have professional foresters, biologists, geologists, and other specialists to help advise. We have thoughtful leaders and constructive solution seekers. Our hope is that better understanding, greater trust, and wiser decisions will come from better information. We invite you into the richness of this forest story.

*Andrea E. Tuttle*

Andrea E. Tuttle, Director  
California Department of Forestry and Fire Protection



*Jackson Demonstration State Forest*